



US005959568A

United States Patent [19]

Woolley

[11] Patent Number: **5,959,568**[45] Date of Patent: ***Sep. 28, 1999**

[54] MEASURING DISTANCE

[75] Inventor: **Louis A. Woolley**, Clinton, N.Y.[73] Assignee: **Par Government Systems Corporation**,
New Hartford, N.Y.

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **08/670,612**[22] Filed: **Jun. 26, 1996**[51] Int. Cl.⁶ **G01S 13/84; G06F 17/60**[52] U.S. Cl. **342/42; 364/478.03; 364/478.13; 235/385; 340/568; 340/572; 340/825.54; 705/28; 342/125**[58] Field of Search **342/42, 44, 50, 342/51, 125; 235/375, 385; 340/539, 568, 572.8, 825.54; 364/400, 478.01, 478.02, 478.03, 478.13, 478.14; 705/28**

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5,347,274	9/1994	Hassett	340/988
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5,689,239	11/1997	Turner et al.	340/572
5,774,876	6/1998	Woolley et al.	705/28

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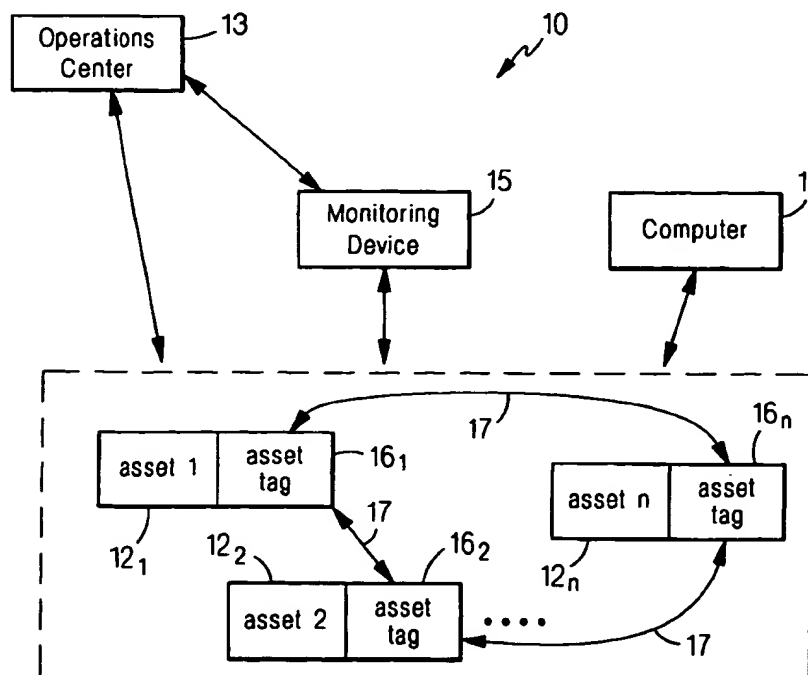
Primary Examiner—John B. Sotomayor

Attorney, Agent, or Firm—Fish & Richardson P.C.

[57] ABSTRACT

An object in a storage area or moving vehicle is monitored by attaching an electronic tag to the object. An electronic device detects the presence of the object by communicating with the tag while the object is in storage or is being moved by the vehicle. The tags may also determine the location of an attached object and may reroute the object if it deviates from a given shipping schedule. A group of objects is monitored by two electronic tags, each attached to an object in the group. Each tag has circuitry for communicating information relating to an object in the group to a second tag. Each tag also includes a memory connected to the circuitry that is capable of storing the information, and a controller connected to the memory and the circuitry. A distance is measured by transmitting multiple symbols from one object to another object, having the symbols returned such that the symbols' measured round-trip times are not all identical, and calculating the distance using the measured round-trip times.

31 Claims, 59 Drawing Sheets





US005804810A

United States Patent [19]

Woolley et al.

[11] **Patent Number:** 5,804,810[45] **Date of Patent:** Sep. 8, 1998[54] **COMMUNICATING WITH ELECTRONIC TAGS**[75] Inventors: **Louis A. Woolley**, Clinton; **James H. Welmar**, Minoa, both of N.Y.[73] Assignee: **Par Government Systems Corporation**, New Hartford, N.Y.

[21] Appl. No.: 672,342

[22] Filed: Jun. 26, 1996

[51] Int. Cl.⁶ G06K 19/06; G06K 15/00; G06F 17/00

[52] U.S. Cl. 235/492; 235/375; 235/383

[58] Field of Search 235/383, 492, 235/375, 382, 486, 385, 380; 340/825.35, 825.31, 572; 342/44

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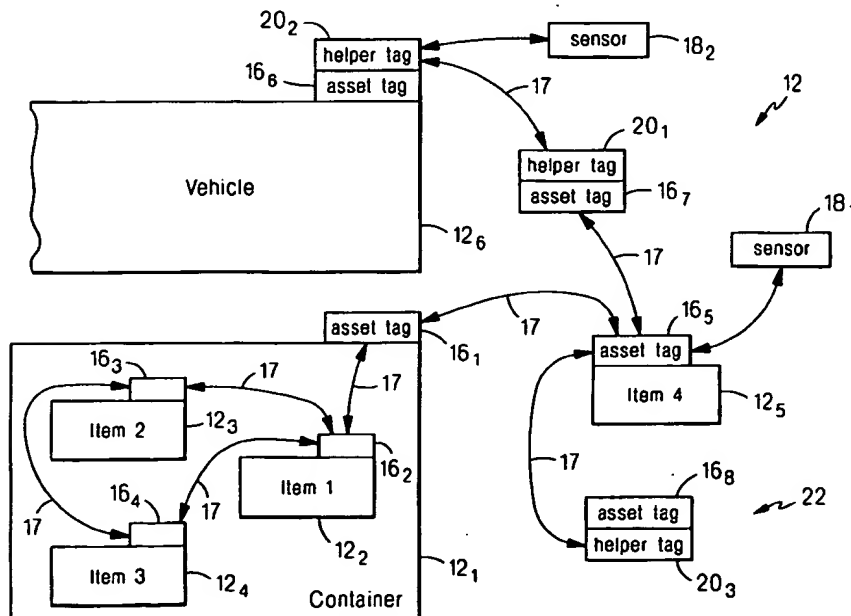
Primary Examiner—Donald T. Hajec

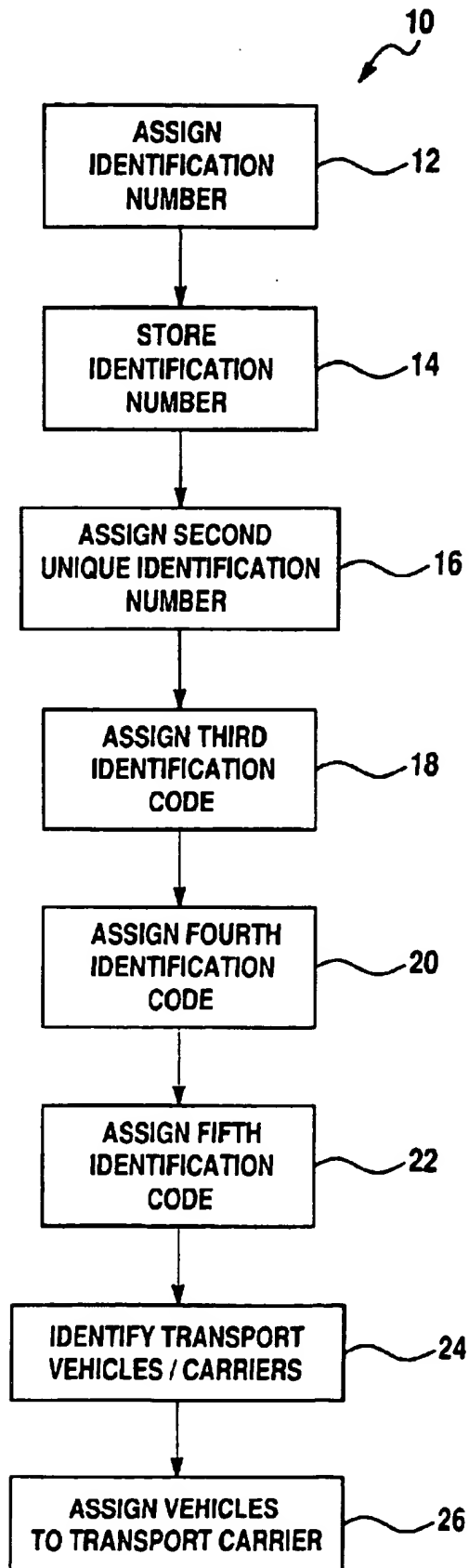
Assistant Examiner—Thien Minh Le

Attorney, Agent, or Firm—Fish & Richardson P.C.

[57] **ABSTRACT**

An object in a storage area or moving vehicle is monitored by attaching an electronic tag to the object. An electronic device detects the presence of the object by communicating with the tag while the object is in storage or is being moved by the vehicle. The tags may also determine the location of an attached object and may reroute the object if it deviates from a given shipping schedule. A group of objects is monitored by two electronic tags, each attached to an object in the group. Each tag has circuitry for communicating information relating to an object in the group to a second tag. Each tag also includes a memory connected to the circuitry that is capable of storing the information, and a controller connected to the memory and the circuitry. A computer is used that has circuitry for communicating with a tag.

23 Claims, 59 Drawing Sheets

Figure 1



US005774876A

United States Patent [19]

Woolley et al.

[11] Patent Number: 5,774,876
[45] Date of Patent: Jun. 30, 1998

[54] MANAGING ASSETS WITH ACTIVE ELECTRONIC TAGS

[75] Inventors: Louis A. Woolley, Clinton; Charles F. Ferrara, Sauquoit; Ian Greasley, Camden; James H. Welmar, Minoa, all of N.Y.

[73] Assignee: Par Government Systems Corporation, New Hartford, N.Y.

[21] Appl. No.: 671,491

[22] Filed: Jun. 26, 1996

[51] Int. Cl.⁶ G06F 17/60

[52] U.S. Cl. 705/28; 235/385; 340/568; 340/572; 340/825.54; 364/478.01; 364/478.02; 364/478.03; 364/478.13

[58] Field of Search 235/375, 385; 340/539, 568, 572.8, 825.54; 342/42; 364/400, 478.01, 478.02, 478.03, 478.13, 478.14, 550; 395/228; 705/28

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"TMS Wins Vehicle Location Contract for Des Moines Metro", Earth Observation Magazine, p. 12, Oct. 1995.

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3M Fleet Management System Pinpoints Bus Activity, 3M, 2 pages, No date.

Okabe et al., "Spatial Tesselations Concepts and Applications of Voronoi Diagrams", chapters 1-4, pp. 1-10, 65-121, 209-271. No date.

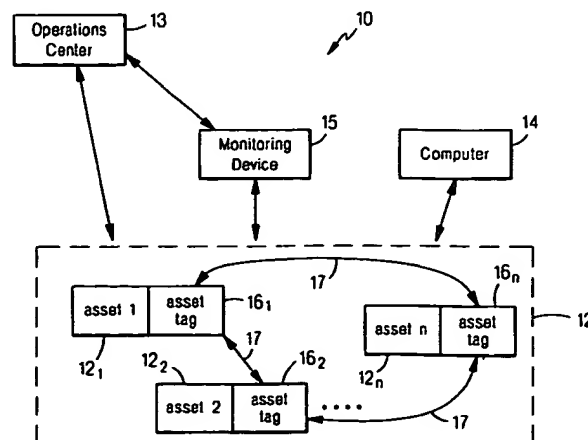
Primary Examiner—Edward R. Cosimano

Attorney, Agent, or Firm—Fish & Richardson P.C.

[57] ABSTRACT

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60 Claims, 59 Drawing Sheets





US005959568A

United States Patent [19] Woolley

[11] Patent Number: **5,959,568**
[45] Date of Patent: ***Sep. 28, 1999**

[54] MEASURING DISTANCE

[75] Inventor: **Louis A. Woolley, Clinton, N.Y.**

[73] Assignee: **Par Government Systems Corporation,**
New Hartford, N.Y.

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[21] Appl. No.: **08/670,612**

[22] Filed: **Jun. 26, 1996**

[51] Int. Cl.⁶ **G01S 13/84; G06F 17/60**

[52] U.S. Cl. **342/42; 364/478.03; 364/478.13;**
235/385; 340/568; 340/572; 340/825.54;
705/28; 342/125

[58] Field of Search **342/42, 44, 50,**
342/51, 125; 235/375, 385; 340/539, 568,
572.8, 825.54; 364/400, 478.01, 478.02,
478.03, 478.13, 478.14; 705/28

[56] References Cited

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4,688,244	8/1987	Hannon et al.	379/58
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5,233,353	8/1993	Guena et al.	342/125
5,278,563	1/1994	Spiess	342/44
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5,689,239	11/1997	Turner et al.	340/572
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Okabe et al., "Spatial Tessellations Concepts and Applications of Voronoi Diagrams", chapters 1-4.

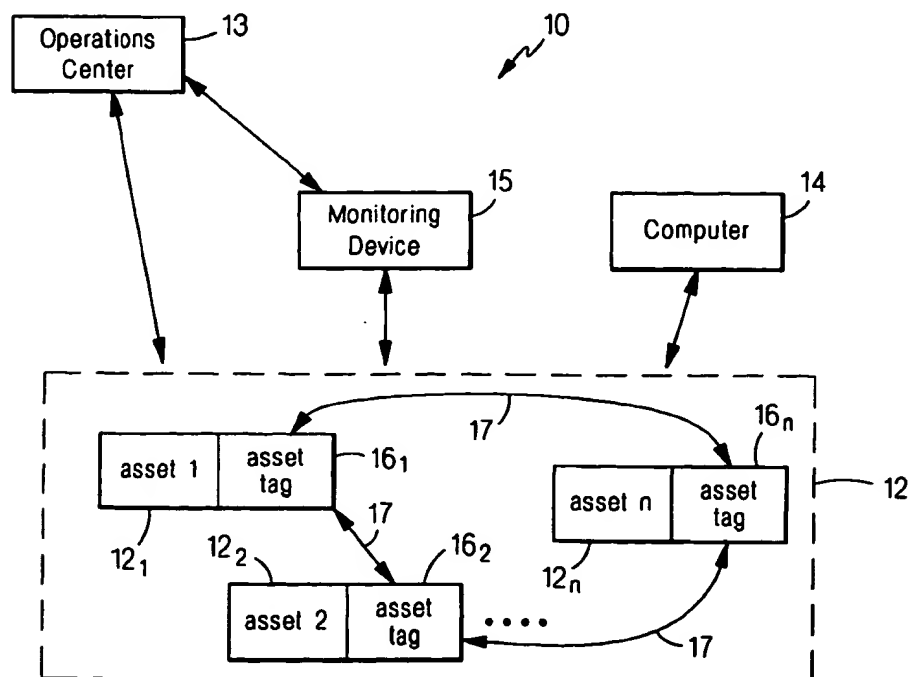
Primary Examiner—John B. Sotomayor

Attorney, Agent, or Firm—Fish & Richardson P.C.

[57] ABSTRACT

An object in a storage area or moving vehicle is monitored by attaching an electronic tag to the object. An electronic device detects the presence of the object by communicating with the tag while the object is in storage or is being moved by the vehicle. The tags may also determine the location of an attached object and may reroute the object if it deviates from a given shipping schedule. A group of objects is monitored by two electronic tags, each attached to an object in the group. Each tag has circuitry for communicating information relating to an object in the group to a second tag. Each tag also includes a memory connected to the circuitry that is capable of storing the information, and a controller connected to the memory and the circuitry. A distance is measured by transmitting multiple symbols from one object to another object, having the symbols returned such that the symbols' measured round-trip times are not all identical, and calculating the distance using the measured round-trip times.

31 Claims, 59 Drawing Sheets





US005892441A

United States Patent [19]

Woolley et al.

[11] Patent Number: 5,892,441

[45] Date of Patent: *Apr. 6, 1999

[54] SENSING WITH ACTIVE ELECTRONIC TAGS

[75] Inventors: Louis A. Woolley, Clinton; James H. Weimar, Minoa, both of N.Y.

[73] Assignee: PAR Government Systems Corporation, New Hartford, N.Y.

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: 670,621

[22] Filed: Jun. 26, 1996

[51] Int. Cl.⁶ G08B 1/08

[52] U.S. Cl. 340/539; 340/372; 340/825.36; 340/825.49; 235/384

[58] Field of Search 340/539, 531, 340/825.69, 825.72, 825.49, 825.36, 572; 342/357, 450, 457; 235/384

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Primary Examiner—Donnie L. Crosland

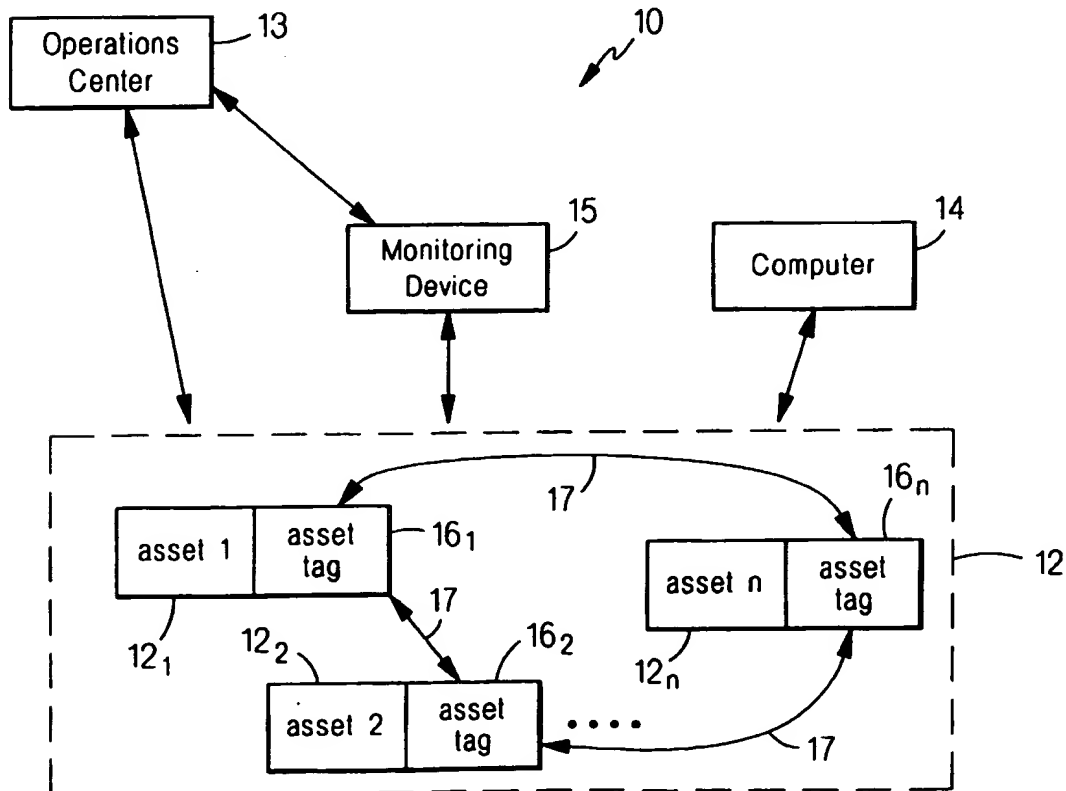
Attorney, Agent, or Firm—Fish & Richardson P.C.

[57]

ABSTRACT

An object in a storage area or moving vehicle is monitored by attaching an electronic tag to the object. An electronic device detects the presence of the object by communicating with the tag while the object is in storage or is being moved by the vehicle. The tags may also determine the location of an attached object and may reroute the object if it deviates from a given shipping schedule. A group of objects is monitored by two electronic tags, each attached to an object in the group. Each tag has circuitry for communicating information relating to an object in the group to a second tag. Each tag also includes a memory connected to the circuitry that is capable of storing the information, and a controller connected to the memory and the circuitry. A sensor is used to detect the condition of an object and communicate the condition to a tag.

12 Claims, 59 Drawing Sheets





US005742237A

United States Patent [19]

Bledsoe

[11] Patent Number: 5,742,237
[45] Date of Patent: Apr. 21, 1998

[54] TAG LOCATION MONITOR

[75] Inventor: William Byron Bledsoe, Marietta, Ga.

[73] Assignee: Lockheed Martin Corporation,
Bethesda, Md.

[21] Appl. No.: 565,092

[22] Filed: Nov. 30, 1995

[51] Int. Cl.⁶ G06K 15/00; H04B 7/00;
G08B 5/22; H04Q 7/00[52] U.S. Cl. 340/825.49; 340/825.35;
340/825.54; 340/572; 235/375[58] Field of Search 340/825.49, 825.54,
340/825.35, 825.02, 825.06, 539, 572, 825.03,
827, 825.36, 505, 568; 235/375

[56] References Cited

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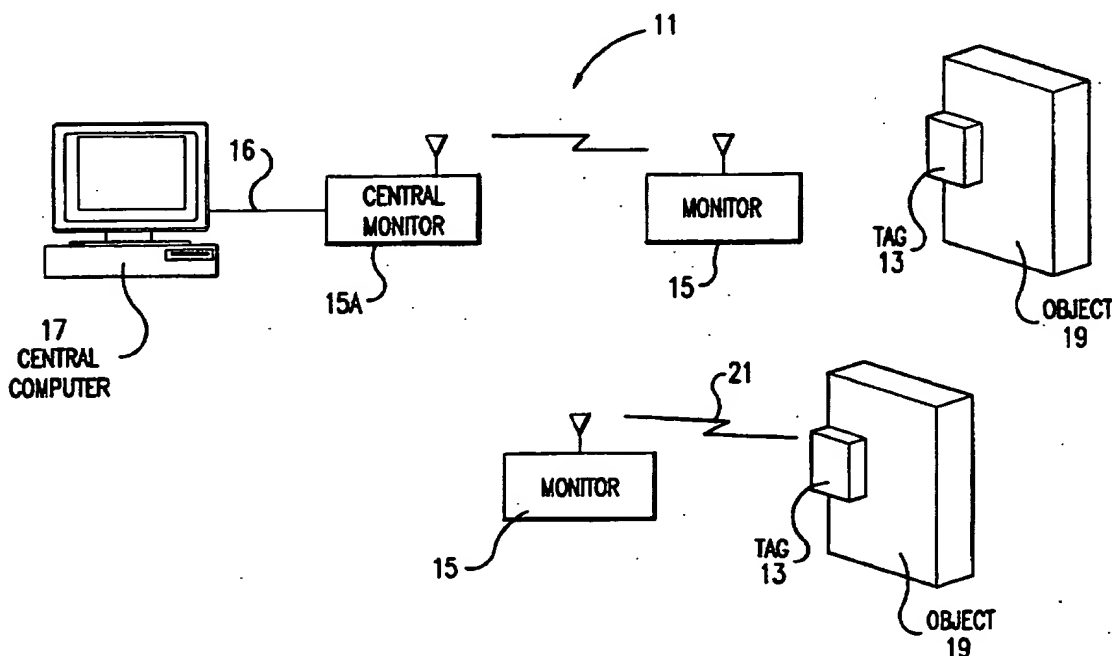
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5,594,425	1/1997	Ladner et al.	340/825.06

Primary Examiner—Michael Horabik
Assistant Examiner—Yonel Beaulieu
Attorney, Agent, or Firm—Eric R. Katz

[57] ABSTRACT

A monitor network of a tag location system includes a grid of monitors for transmitting and receiving messages from neighboring monitors and tags within range of the monitor. Also provided is a memory device for storing: a unique identity of the monitor; each input partner monitor from which the monitor receives messages, and an output partner monitor to which the monitor sends messages; monitor and tag signals; a signal strength of the tag signals and significant changes thereto; an acknowledgement signal; and a distress signal indicating that the monitor has not received acknowledgement signal from its output partner monitor. Further there is a computer for periodically causing all tag signals, associated signal strengths and significant changes stored in the memory device to be transmitted to the output partner monitor, for forwarding received monitor messages to the output partner monitor, for issuing the acknowledgement message to be transmitted of a monitor message, for determining receipt of an acknowledgement and for sending a distress signal to all neighboring monitors within range of the monitor if an acknowledgement signal is not received from the output partner monitor. Tag signals issued by tags and received by the monitor directly from tags within range of the monitor or from input partner monitors are transmitted to the output partner monitor for forwarding to the central station, and wherein, monitor messages issued by the central station and receive from input monitors are transmitted, if required, to the output monitor.

12 Claims, 90 Drawing Sheets





US006597310B2

(12) **United States Patent**
Itoh et al.

(10) Patent No.: **US 6,597,310 B2**
(45) Date of Patent: **Jul. 22, 2003**

(54) **COLLECTION/DELIVERY NAVIGATION SYSTEM**

5,875,412 A 2/1999 Sulich et al. 701/207
5,978,771 A 11/1999 Vandivier, III 705/8

(75) Inventors: Masakazu Itoh, Kamakura (JP);
Manabu Miyatake, Kawasaki (JP)

FOREIGN PATENT DOCUMENTS

JP 6-111197 4/1994

(73) Assignee: Hitachi, Ltd., Tokyo (JP)

Primary Examiner—Theodore M. Blum

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(74) Attorney, Agent, or Firm—Mattingly, Stanger & Malur, P.C.

(57) ABSTRACT

A collection/delivery work support system which can eliminate erroneous delivery of goods, missing delivery and missing collection in collection/delivery service to greatly improve the efficiency of collection of goods. A collection/delivery navigation system for determining and indicating a route for delivery and collection of goods and managing collection and delivery conditions has an electronic slip which stores information described in a slip of a commodity and has a function of transmitting the stored information in response to an external request for information, and a navigation unit for indicating a route for collection and delivery of goods and collection and delivery conditions. The navigation unit has a reader for reading the information stored in the electronic slip, a delivery information table for storing delivery information inclusive of a delivery destination and delivery conditions, a collection information table for storing collection information inclusive of a collection destination and collection conditions, a collection/delivery route generation unit for generating a route for collection and delivery by using the delivery information and the collection information, and an indication device for indicating the collection/delivery route, the delivery information and the collection information.

(21) Appl. No.: 09/988,211

(22) Filed: Nov. 19, 2001

(65) **Prior Publication Data**

US 2002/0044084 A1 Apr. 18, 2002

Related U.S. Application Data

(63) Continuation of application No. 09/056,644, filed on Apr. 8, 1998, now Pat. No. 6,335,702.

(30) **Foreign Application Priority Data**

Apr. 10, 1997 (JP) 09-092114

(51) Int. Cl.⁷ G01S 5/02; H04B 7/185

(52) U.S. Cl. 342/357.01; 701/201

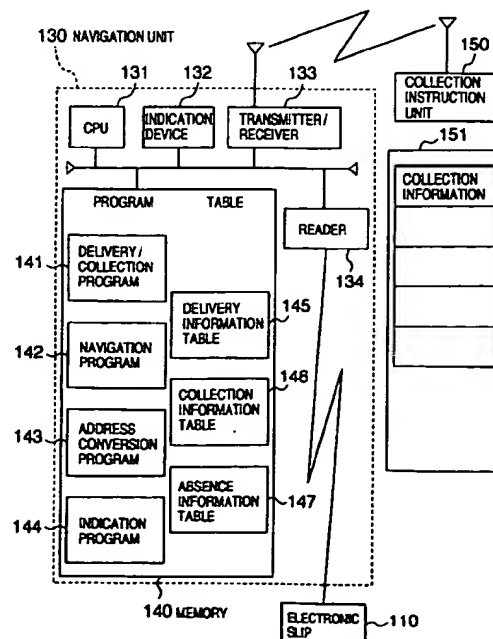
(58) Field of Search 342/357.01; 701/201,
701/202, 209

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4 Claims, 6 Drawing Sheets





US006588661B2

(12) **United States Patent**
Degrauwe et al.

(10) **Patent No.:** **US 6,588,661 B2**
(45) **Date of Patent:** **Jul. 8, 2003**

(54) **SYSTEM AND METHOD FOR WIRELESS COMMUNICATION BETWEEN SEVERAL TRANSCEIVERS, ARRANGED RESPECTIVELY IN SEVERAL DELIMITED SPACES, AND PORTABLE ELECTRONIC UNITS**

6,107,910 A * 8/2000 Nysen 340/10.1
6,342,844 B1 * 1/2002 Rozin 340/933

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Primary Examiner—Karl D. Frech
Assistant Examiner—Edwyn Labaze
(74) *Attorney, Agent, or Firm*—Sughrue Mion, PLLC

(75) **Inventors:** **Marc Degrauwe, Chez-le-Bart (CH);**
Olivier Desjeux, Le Landeron (CH)

(73) **Assignee:** **EM Microelectronic-Marin SA, Marin (CH)**

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **10/084,058**

(22) **Filed:** **Feb. 28, 2002**

(65) **Prior Publication Data**

US 2002/0134833 A1 Sep. 26, 2002

(30) **Foreign Application Priority Data**

Mar. 23, 2001 (EP) 01810307

(51) **Int. Cl.⁷** **G06K 5/00**

(52) **U.S. Cl.** **235/382; 235/384**

(58) **Field of Search** **235/375, 382, 235/384; 340/928, 825, 933; 701/117; 342/42**

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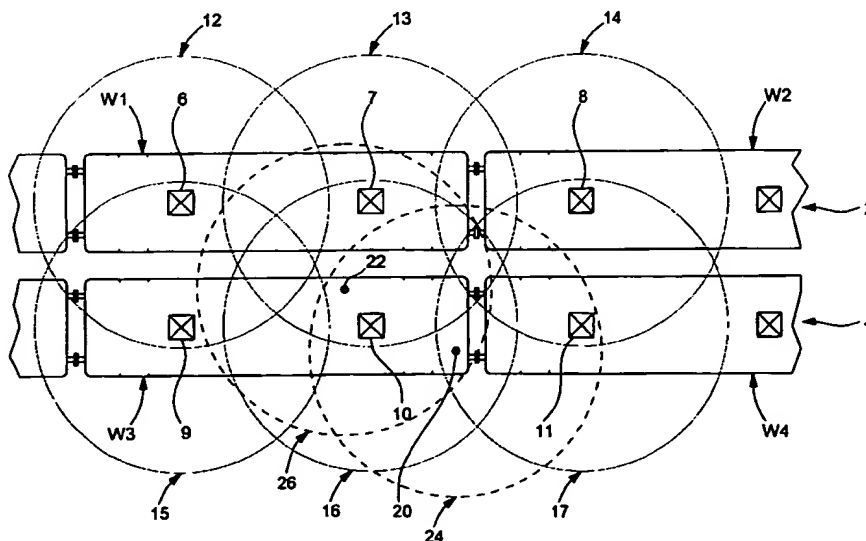
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(57) **ABSTRACT**

System for communication between a plurality of transceivers, transmitting in particular at a high frequency and arranged respectively in a plurality of delimited spaces each having at least one entrance, and portable electronic units fitted with means for radio-communication with the plurality of transceivers, in particular with a view to detecting each of them penetrating one of the delimited spaces. The communication between the transceivers and the portable electronic units for neighboring delimited spaces is effected at different exclusive frequencies or frequencies of sub-sets of frequencies associated with the exclusive frequencies. In order to do this, devices for occupying an exclusive frequency are provided which include listening circuits (30, 32, 34, 36, 38, 46, 48) for determining whether an occupied signal is present on any frequency of a set of exclusive frequencies able to be selected and/or whether a determined amplitude threshold is received for this frequency, and transmission circuits (30, 52, 54, 56, 58) arranged to transmit an occupied signal in a selected exclusive frequency. This system thus prevents disturbances or interference between portable units located in a delimited space and a transceiver arranged in a neighboring delimited space.

14 Claims, 4 Drawing Sheets





(10) **Patent No.:** US 6,791,472 B1
(45) **Date of Patent:** Sep. 14, 2004

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| 6,028,857 | A | * | 2/2000 | Poor | 370/351 |
| 6,150,961 | A | * | 11/2000 | Alewine et al. | 340/995.1 |

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Primary Examiner—Benjamin C. Lee

(74) *Attorney, Agent, or Firm*—Milde & Hoffberg, LLP

(57) **ABSTRACT**

A mobile communications device comprising a location sensing system, producing a location output; a memory, storing a set of locations and associated events; a telecommunications device, communicating event and location information between a remote system and said memory; and a processor, processing said location output in conjunction with said stored locations and associated events in said memory, to determine a priority thereof.

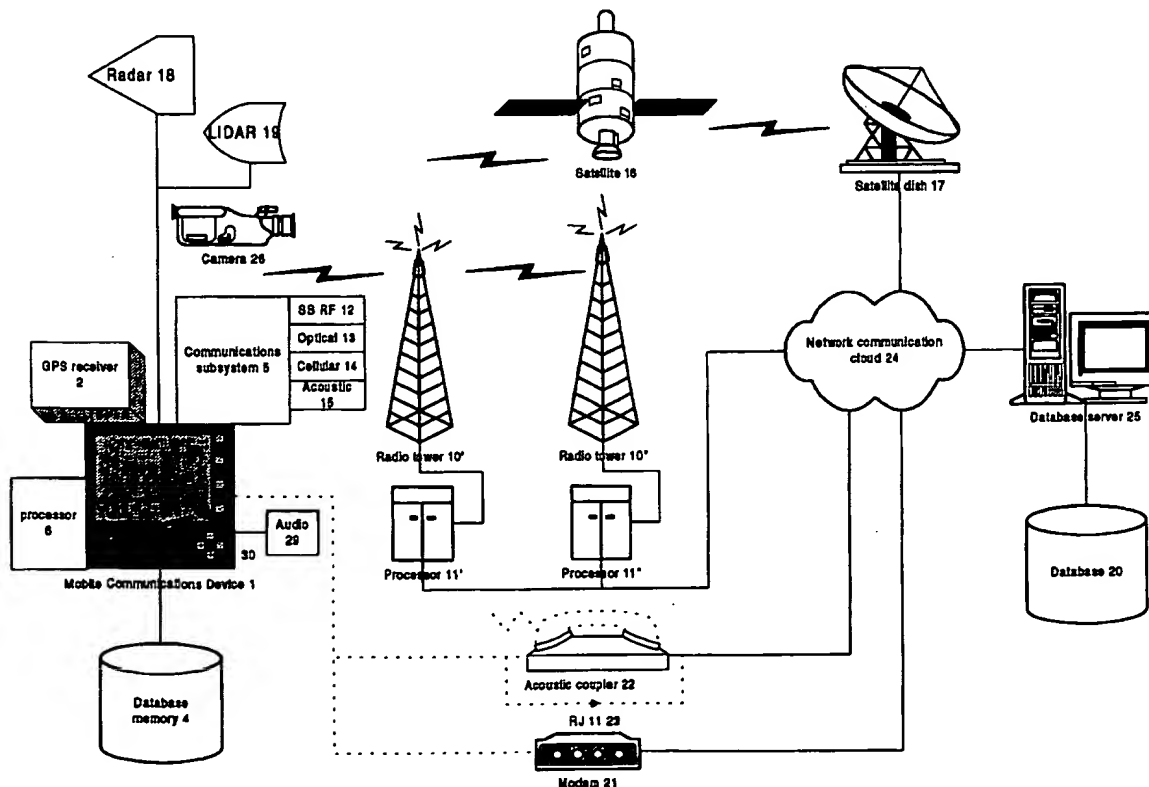
- (63) Continuation of application No. 09/236,184, filed on Jan. 25, 1999, now Pat. No. 6,252,544.
- (60) Provisional application No. 60/072,757, filed on Jan. 27, 1998.
- (51) Int. Cl.⁷ G08G 1/09
- (52) U.S. Cl. 340/905; 340/995.1; 340/539.17;
340/995.13; 370/351; 701/117; 701/119
- (58) Field of Search 340/995.1, 995.13,
340/905, 825.22, 539.17; 701/117, 119;
380/271; 370/351

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16 Claims, 2 Drawing Sheets





US006150961A

United States Patent [19]**Alewine et al.**[11] **Patent Number:** **6,150,961**[45] **Date of Patent:** **Nov. 21, 2000**[54] **AUTOMATED TRAFFIC MAPPING**

[75] Inventors: **Neal J. Alewine**, Lakeworth, Fla.;
James C. Colson, Austin, Tex.;
Abraham P. Ittycheriah; **Stephane H. Maes**, both of Danbury, Conn.; **Paul A. Moskowitz**, Yorktown Heights, N.Y.

[73] Assignee: **International Business Machines Corporation**, Armonk, N.Y.

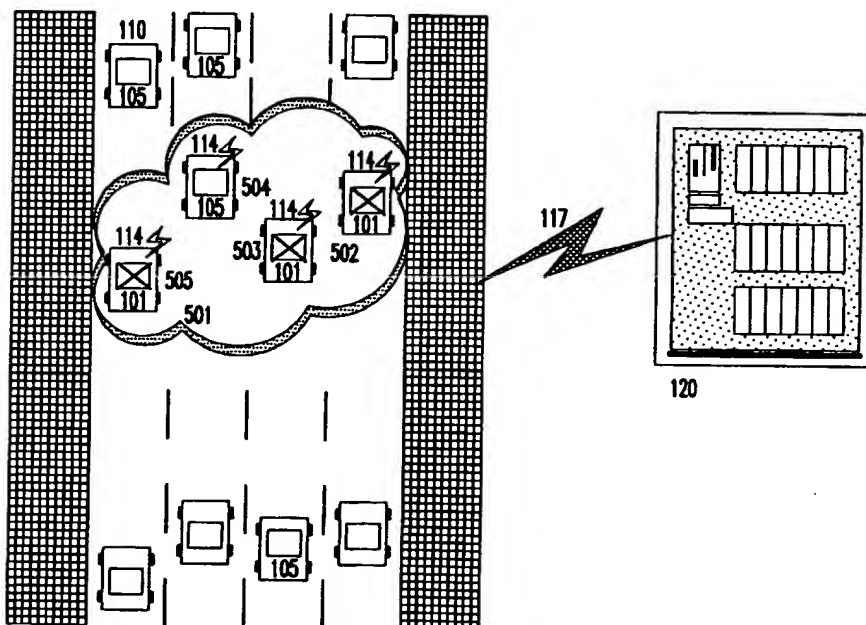
[21] Appl. No.: **09/198,378**[22] Filed: **Nov. 24, 1998**[51] Int. Cl.⁷ **G08G 1/123**[52] U.S. Cl. **340/995; 340/989; 340/905; 455/507; 455/509; 455/575; 701/117; 701/118; 701/119; 701/213; 380/271**[58] Field of Search **340/995, 989, 340/905; 455/456, 509, 507, 575; 701/207, 118, 215, 119, 200, 213, 117; 380/271**[56] **References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—Benjamin C. Lee*Attorney, Agent, or Firm*—McGuireWoods LLP; Stephen C. Kaufman[57] **ABSTRACT**

A system of mobile units are installed in multiple vehicles in traffic. These mobile units include both wireless communications devices and apparatus that determines the location of each vehicle. Monitoring a vehicle's position as a function of time also reveals the velocity of the vehicle. Position and speed information is periodically broadcast by the vehicles to a central monitoring station and to neighboring vehicles. At the central monitoring station, the collective input of a set of vehicles is processed to provide an instant chart of traffic conditions in the area. Warnings of delays or updates on traffic conditions on the road ahead are then automatically returned to subscribers of the information or are used as part of an Intelligent Vehicle Highway System (IVHS). Neighboring vehicles within a region communicating with one another form a network in which the broadcast information is processed locally on the respective vehicles to estimate possible problems ahead and consider computing an alternate road and/or checking with the central monitoring station for more information. If out of range of the central monitoring station, the vehicles in the network form a local area network for the exchange and update of information, and when any vehicle in the network is within range of the central monitoring station, the local area network data is uploaded to help update the overall traffic information.

10 Claims, 5 Drawing Sheets



US006028857A

United States Patent [19]
Poor

[11] **Patent Number:** **6,028,857**
[45] **Date of Patent:** **Feb. 22, 2000**

[54] **SELF-ORGANIZING NETWORK**

[75] **Inventor:** **Robert D. Poor**, Cambridge, Mass.

[73] **Assignee:** **Massachusetts Institute of Technology**, Cambridge, Mass.

[21] **Appl. No.:** **08/899,782**

[22] **Filed:** **Jul. 25, 1997**

[51] **Int. Cl.⁷** **H04J 3/24**

[52] **U.S. Cl.** **370/351; 370/400**

[58] **Field of Search** **370/351, 252, 370/254, 256, 349, 350, 389, 352, 353, 395, 400, 392; 455/445**

[56] **References Cited**

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Primary Examiner—Dang Ton

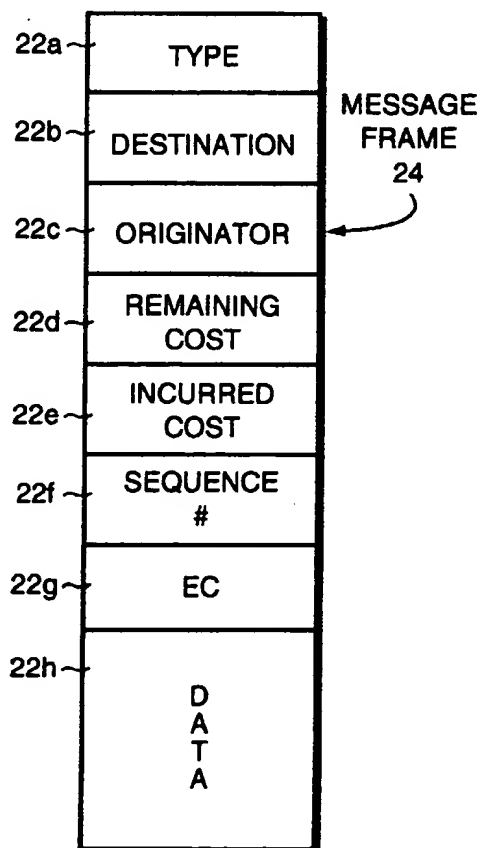
Assistant Examiner—Tuan Q. Ho

Attorney, Agent, or Firm—Cesari and McKenna

[57] **ABSTRACT**

A self-organizing wireless network includes a plurality of nodes, each of which is configured to originate messages, be a destination of messages and relay messages. Each message is transmitted in a frame that includes the cost of conveying the message to the destination node for the message and also the cost so far expended in the conveying of the message. Each time the message frame is transmitted, either by the originating node or by a relaying node, the node ascertains whether the cost to convey the message from that node to the destination node is less than the conveying cost contained in the received frame. If it is, the node retransmits the frame after having incremented the incurred cost by the relay cost of that node and decremented the cost to convey by the same value. Otherwise the node discards the message.

3 Claims, 4 Drawing Sheets



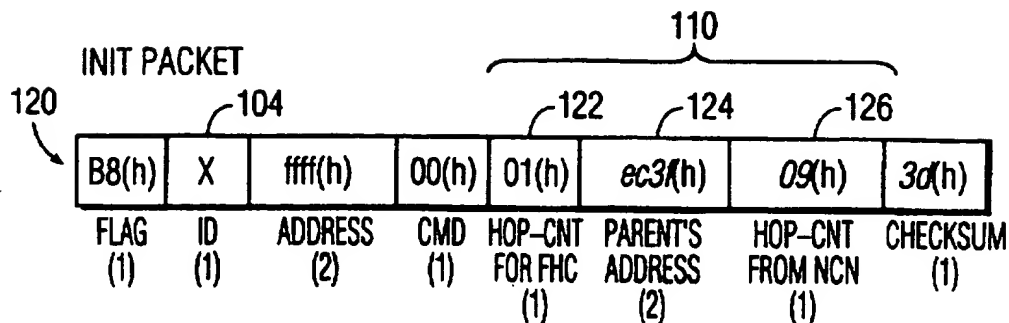


FIG. 5

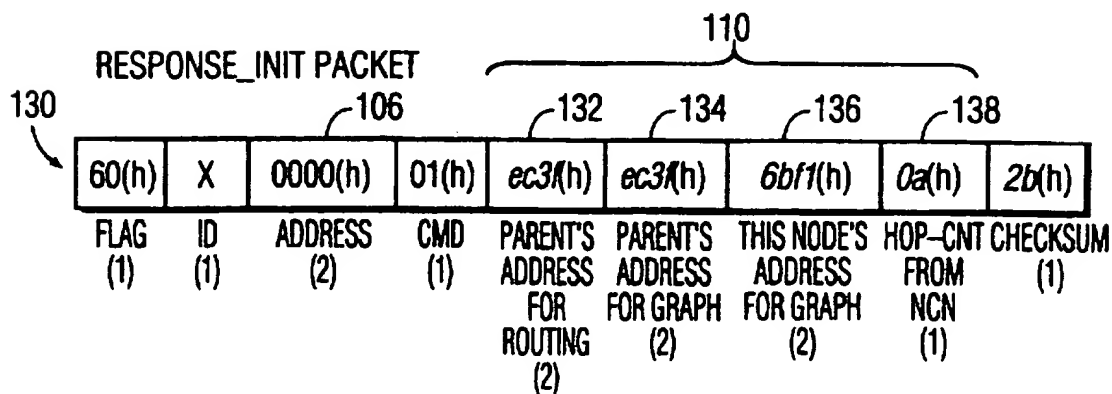


FIG. 6



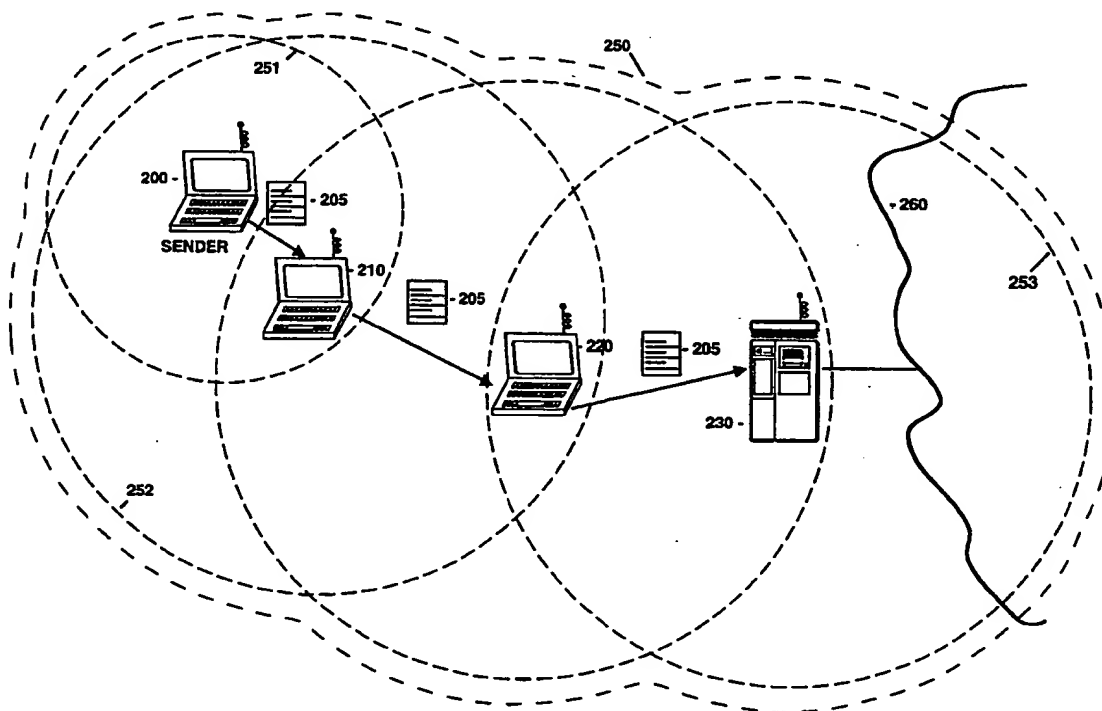
US005621798A

United States Patent [19]**Aucsmith**[11] **Patent Number:** **5,621,798**[45] **Date of Patent:** **Apr. 15, 1997**[54] **METHOD AND APPARATUS FOR COOPERATIVE MESSAGING**[75] **Inventor:** David W. Aucsmith, Portland, Oreg.[73] **Assignee:** Intel Corporation, Santa Clara, Calif.[21] **Appl. No.:** 423,306[22] **Filed:** Apr. 18, 1995[51] **Int. Cl.⁶** H04K 1/00[52] **U.S. Cl.** 380/25; 340/825.07; 340/825.52;
364/242.95[58] **Field of Search** 380/3, 4, 23, 25;
340/825.07, 825.52; 364/242.95[56] **References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—David C. Cain**Attorney, Agent, or Firm**—Blakely, Sokoloff, Taylor & Zafman[57] **ABSTRACT**

A wireless network is disclosed that comprises base transmitter/receiver stations coupled to a trunk communications network and several mobile computing devices that are capable of transmitting and receiving messages. Messages to be transmitted will be encrypted and digitally signed to insure privacy and authentication of the messages. Each mobile computing device that participates in the wireless network is capable of voluntarily allocating some amount of memory for cooperative messaging storage. Each mobile computing device is responsible for receiving messages addressed to other devices, storing the received messages in the allocated memory and then periodically retransmitting the received messages. Each message includes a unique serial number and time/date stamp. The message serial numbers are used to prevent duplicate messages being stored in the allocated memory. Furthermore, the time/date stamps on the messages stored in the allocated memory are periodically examined such that outdated messages are automatically killed after some specified time interval.

9 Claims, 6 Drawing Sheets

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/19126

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06K7/00 G06K19/07

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	WO 95 22138 A (SEATTLE SILICON CORP) 17 August 1995 (1995-08-17) page 4, line 28 -page 10, line 25 -/--	1,9,17, 22,28, 32,34, 79,89, 98,102

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

24 October 2000

Date of mailing of the international search report

02/11/2000

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Goossens, A

INTERNATIONAL SEARCH REPORT

Initial Application No
PCT/US 00/19126

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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International Application No

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US 20040174260A1

(19) **United States**(12) **Patent Application Publication**
Wagner(10) **Pub. No.: US 2004/0174260 A1**(43) **Pub. Date: Sep. 9, 2004**(54) **MONITORING AND TRACKING OF ASSETS
BY UTILIZING WIRELESS
COMMUNICATIONS**filed on May 8, 2002. Provisional application No.
60/350,601, filed on Jan. 22, 2002.(76) **Inventor: Ronald E. Wagner, Winger Springs,
FL (US)**

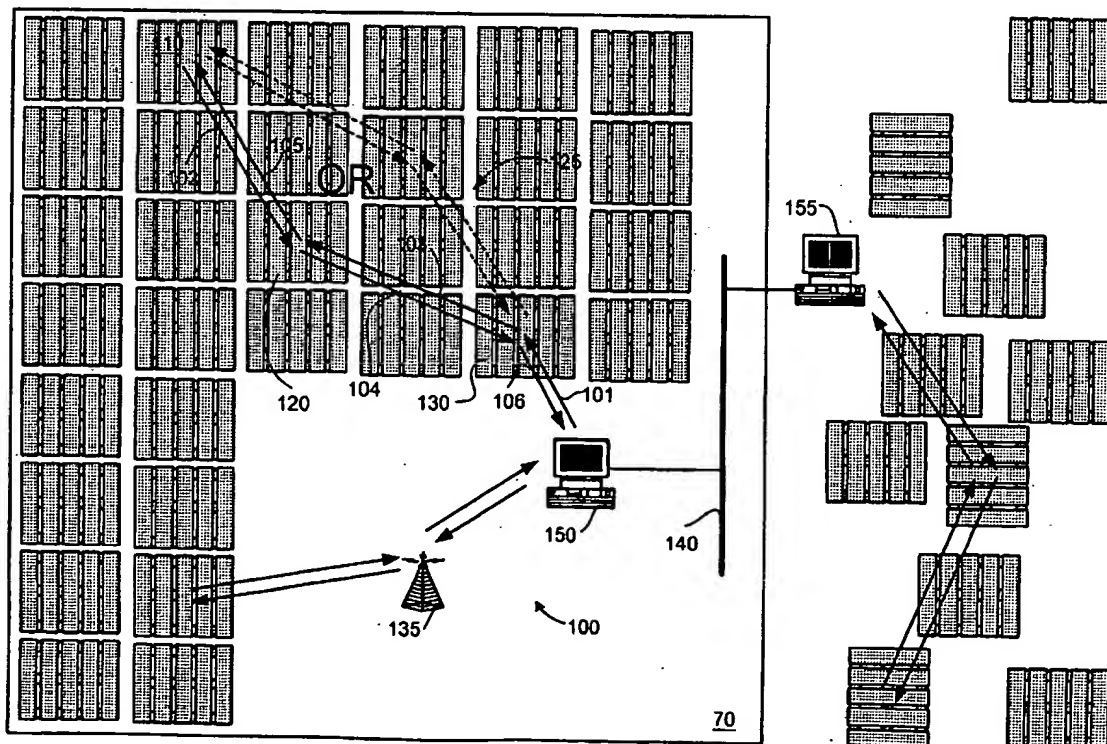
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ATLANTA, GA 30339-5948 (US)****Publication Classification**(51) **Int. Cl.⁷ G08B 13/14**(52) **U.S. Cl. 340/568.1; 340/572.1**(21) **Appl. No.: 10/804,280**(22) **Filed: Mar. 19, 2004****Related U.S. Application Data**(63) **Continuation of application No. 10/324,422, filed on
Dec. 20, 2002.**(60) **Provisional application No. 60/349,533, filed on Jan.
18, 2002. Provisional application No. 60/378,731,**

(57)

ABSTRACT

Systems, devices, methods, and programs disclosed herein provide a solution for monitoring and tracking assets by utilizing wireless communications. A representative system for monitoring assets includes a remote monitoring station (RMS) and a network of identification (ID) tags. Each ID tag is coupled to an asset and is configured to wirelessly communicate with other ID tags in the network within a predetermined proximity. Each tag is also configured to relay communications from other ID tags so that a communication path is established between the RMS and any ID tag in the network, either directly or via other ID tags.





US 20030137968A1

(19) **United States**(12) **Patent Application Publication****Lareau et al.**(10) **Pub. No.: US 2003/0137968 A1**(43) **Pub. Date: Jul. 24, 2003**(54) **MONITORING AND TRACKING OF ASSETS
BY UTILIZING WIRELESS
COMMUNICATIONS**filed on May 8, 2002. Provisional application No.
60/350,601, filed on Jan. 22, 2002.**Publication Classification**(76) **Inventors:** Neil William Lareau, Duluth, GA
(US); Ronald Earl Wagner, Winter
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Welch, Atlanta, GA (US)(51) **Int. Cl.⁷** **H04J 3/24**(52) **U.S. Cl.** **370/349****Correspondence Address:****THOMAS, KAYDEN, HORSTEMEYER &
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STE 1750
ATLANTA, GA 30339-5948 (US)(57) **ABSTRACT**

Systems, devices, methods, and programs disclosed herein provide a solution for monitoring and tracking assets by utilizing wireless communications. A representative system for monitoring assets includes a remote monitoring station (RMS) and a network of identification (ID) tags. Each ID tag is coupled to an asset and is configured to wirelessly communicate with other ID tags in the network within a predetermined proximity. Each tag is also configured to relay communications from other ID tags so that a communication path is established between the RMS and any ID tag in the network, either directly or via other ID tags.

(21) **Appl. No.:** 10/324,422(22) **Filed:** Dec. 20, 2002**Related U.S. Application Data**(60) Provisional application No. 60/349,533, filed on Jan.
18, 2002. Provisional application No. 60/378,731,